

## Gas Flow Meter



Mass flow meters are the most prevalent method used to accurately measure flow rate. However, mass flow meters must be calibrated separately for each gas or gas mixture in order to be useful. The Idaho National Laboratory (INL) has developed a novel gas flow meter. This device measures the flow rate of mixed gases, pure gases, and gas systems. The device has been tested to give accurate values for flow rates as low as 5 mL/min. This invention is capable of accurately measuring flow rate of any gas or gas mixture without the need for calibration. This is especially useful in

situations where the composition of the flowing gas is changing over time. Devices can be manufactured for a number of different flow rates - from very low flow rates to very high flow rates.

The INL has developed a novel flow meter out of a need to have an inexpensive method to measure constantly changing gas mixtures. Off the shelf mass flow meters require recalibration with each new gas mixture introduced. In addition, such mass flow meters are expensive.

The INL has developed a device that calculates gas

flow rate based on the ideal gas law and rate of pressure build-up in a container of known volume. The basic device is shown in figure 1. The device essentially measures the time it takes to fill a tank of gas to a known pressure. Using the ideal gas law, the moles of gas prior to filling the tank, and the moles of gas after filling the tank can be calculated. With simple algebra, the flow rate is calculated.

The device functions using a pressure transducer, a valve, and timing device, and a tank with pressure sensors. As shown in figure 1, two tanks and a

*Continued next page*



*Continued from previous page*

**For more information:**

Business Contact  
**Jason Stolworthy**  
 208.526.5976  
[Jason.Stolworthy@inl.gov](mailto:Jason.Stolworthy@inl.gov)  
[www.inl.gov/techtransfer](http://www.inl.gov/techtransfer)

A U.S. Department of Energy  
 National Laboratory



four way valve may be employed for continuous operation and simplicity. With each 90 degree turn of the valve, a tank is filled while the other is reset to the environmental pressure (usually atmospheric pressure). The simplicity, universal applicability, and accuracy of the device makes it ideal for commercial applications.

**Benefits**

INL's novel gas flow meter has several advantages over prior technologies, including:

- The ability to accurately measure the flow rate of mixed gases, pure gases, and gas systems
- The ability to provide accurate values for flow rates as low as 5 mL/min
- The elimination of the need to calibrate for different gas mixtures
- The ability to accurately measure gas pressure as the gas mixture changes with time
- Simplicity in design
- Reliability
- Low manufacturing costs

**Partnering with INL**

The INL's goal is to find a party interested in commercializing INL's novel gas flow meter. INL has a patent on the method and device. See patent no. 7,082,826. The INL invites interested parties to contact us regarding licensing details.

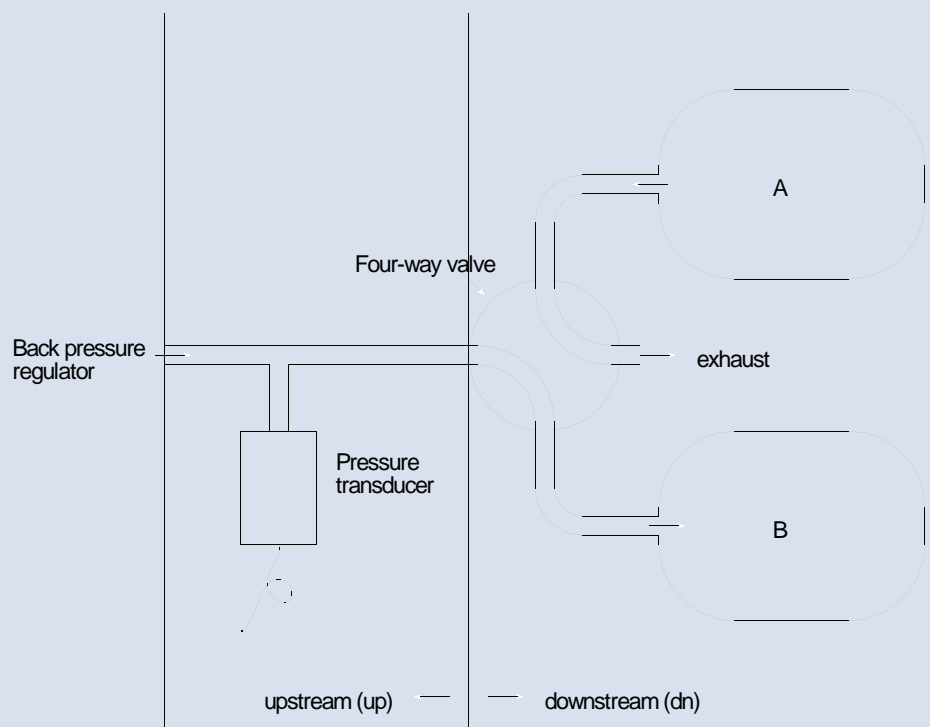


Figure 1. Drawing illustrating the flow path downstream of the back pressure regulator.